NATURAL HISTORY,

FOR

INFANT SCHOOLS.

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PART II.

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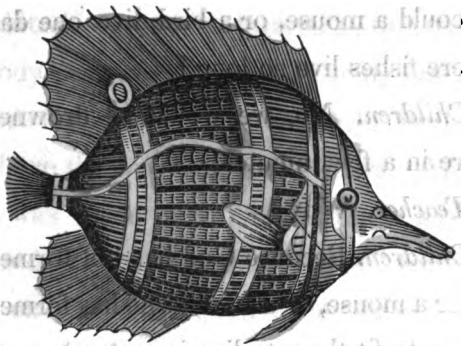
NATURAL HISTORY.



FISHES.

Teacher. To which class of animals do fishes belong?

Children. To the fourth class.

Teacher. Where do fishes live?

Children. Some live in seas, some in rivers and lakes, and some in small streams and ponds.

Teacher. Fishes live a long time; some

have lived an hundred years. Could you, or could a mouse, or a bird, live one day where fishes live so long?

Children. No, we would be drowned there in a few minutes.

Teacher. Why?

Children. Because God has not formed us, or a mouse, or a bird, as he has formed fishes, to fit them to live in water.

Teacher. One night a little mouse, in hunting for something to eat, tried to run along the edge of a basin which had water in it; but down the poor mouse fell into the water, and could not get out again. Can you think how it managed to keep itself from being drowned?

Children. No.

Teacher. When it felt that the water

was deep enough to cover its head, it fixed itself on its hind legs, so as to keep its body upright; and then, placing its two fore feet under its chin, it held its head above the water for three hours. When it was taken out of the water, it was so tired, it could scarcely move, but was soon rested, and ran away quite lively. How do you think that little mouse could know that it was not made like a fish, and so would die if its head was in water?

Children. God taught it to know that.

Teacher. The wise and good Creator of animals fits each kind for the place in which he chooses that kind shall live, and gives to each what we call *instinct.* The little mouse had not *reason*, so it could not have learned, as you, who have *reason* can, the

difference between itself and a fish; but God directed it by the *instinct* he had given to it, how to do what would save its life. Do you know if a fish has bones?

Children. Yes, it has bones.

Teacher. The bones of a fish are strong, though softer than the bones of other animals, and some fishes have only cartilage, that is, gristle, instead of bones. Of what shape are fishes?

Children. They are not all shaped alike.

Teacher. No, but most of them are

larger in the middle than towards the head and tail. Look at the picture of a fish, and you will understand what I say.

That shape suits best for moving fast in water. Most fishes have large mouths, and a great many teeth. Where are your teeth fixed?

Children. In our jaws.

Teacher. Some fishes have as many as two hundred teeth fixed not only in the jaws, but on the roof of the mouth, and all over the tongue. Some are shaped like a sugar loaf, some like a wedge, some like a hook, and some are as fine as the bristles of a brush. A fish, called a Chetoden, has such fine teeth; look at the picture of it on the first page, and tell me what does its round mouth look like?

Children. Like the bill of a bird.

Teacher. It is a pretty fish, with brown bands, edged with white. It lives in the

seas of India. Insects are its food. When it is hungry, it swims to the top of the water, where insects are flying about, and from its long, round mouth, it shoots a drop of water, so as to reach an insect, and bring it down with the drop into its mouth, where the bristling teeth hold it fast. How does a Chetoden know in what way it must use its mouth, which is so different from other fishes?

Children. God chooses it shall eat insects, and gives it the right kind of mouth to catch them with, and teaches it how to use that mouth.

Teacher. Fishes have not as much instinct as some other animals have; but when they begin to live, God gives them as much as they need have, so that the

youngest knows as well as the oldest does, how to do every thing that a fish need do; but it does not know any thing else. Can a fish see?

Children. Yes, a fish has eyes.

Teacher. The eyes of a fish are fixed deep in its head, and are formed for seeing well in water. A fish has not eyelids, to move up and down, but some have along the eye a fine skin, which falls like a veil when the fish has need to cover his eyes. A fish, called an Eel, God chooses shall work its head into mud and sand, to get insects and worms to eat; so he kindly forms its eyes with a thin horny cover over each, which serves to keep out the sand, and for spectacles, to see through. Most fishes have their eyes on the sides

of the head, but some have both eyes on one side. One kind is called a *Star Gazer*, for it is always looking towards the sky. Where do you think its eyes are placed?

Children. On the top of its head.

Teacher. Yes. This is the picture of a wolf fish, which has very bright eyes.

A fish can hear; but because sound can be heard better in water than in air, the ears of a fish are inside of its head, and the openings on the outside are so small they can scarcely be seen. A fish can feel with the end of its mouth, and some have little hairs along the mouth, which serve for

feelers. A fish can smell, too. Can you tell what a fish is covered with?

Children. A fish is covered with scales.

Teacher. A fish has a skin with a thick slippery juice spread all over it, to prevent the water from spoiling it. And on most fishes, oval or round scales are laid in beautiful order. No other kind of clothing would be so useful and pleasant to a fish, for scales are very strong and very light. The scale of a fish one year old is very thin and small, but every year a scale a little larger is added; so, the age of a fish can be known by its scales. If one thick scale can be separated into five thin ones, how old is the fish on which that scale grew?

Children. Five years old.

Teacher. A fish, you know, has no other limbs than fins; they are formed of skin, with gristle or bone to make it stiff, to press against the water. Some fishes have five fins, some six or eight, and some as many as eleven. This fish

has a fin on each side of the neck; they are called *pectoral* fins. The one on the breast, is the *ventral* fin; along the back are the *dorsal* fins; under the body, near to the tail, is the *anal* fin; on the tail, is the *caudal* fin. What use does a fish make of its fins?

Children. A fish uses its fins to swim with.

Teacher. With its fins a fish can balance itself, that is, can keep itself from falling on one side. And as oars are used to move a boat, so a fish can use its fins to move backwards, to turn round, and to dart forward as fast as a bird can fly. There is a fish called a *climbing perch*, because of another use it can make of its fins; what do you think it can do with them?

Children. It can climb with them.

Teacher. In its fins are stiff bones with sharp points; they are called spines; and with them the fish could climb a small tree if it grew quite near the edge of the water. But if a fish-hawk should see it, the poor perch would find that it had better use its fins to swim than to climb. What is a fish-hawk?

Children. A bird that catches fish.

Teacher. Several kinds of birds catch fish. A fish-hawk eats them, and feeds its young ones with them; so it must have a nest that will hold young birds and some fishes too. Where do you think it builds one?

Children. Near to a river.

Teacher. Or a sea. By the instinct God gives it, he teaches it to choose a tall tree there, and to build a very large nest on it, with sticks, and chips, and dry grass. It does not, as most birds do, build a new one every year, but mends the old one every spring. When the hawk is hungry, or has young ones to feed, it goes to the water for a fish. This bird can see very far; it flies slowly round and round

quite high in the air over the water, and when it sees a fish, darts down and catches it with its claws, which are very strong and rough, that it may easily hold a slippery fish, and carry it to its nest. That is the way a hawk gets fishes; how do men catch them?

Children. With a hook.

Teacher. And with nets, made of strong twine or rope. Sometimes fishermen, or boys, go in such a boat as this

and catch fish with a scoop net, which is fastened to the end of a pole; so that it

can be dipped into the water like a ladle, to catch fish. Indians use such a net, to catch very good fish, called white fish, which are in the lakes of North America. Indians have boats made of the bark of a tree; they are called canoes, and are so light that an Indian can carry one in his hand like a basket. Two Indian boys jump into a bark canoe; one stands at one end, to paddle it along, and one stands at the other end, and dips his scoop net, catches a fish, and throws it into the light canoe, which dances about like a cork on the rapid water. I will tell you now about a fish that was once caught with a hook, and of which this is a picture.

We learn in the Bible that certain tax-gatherers wished to know if our Lord and

Saviour Jesus Christ would pay a tax. Peter went to tell him. He knows what all the people in the world are going to say; so, before Peter spoke about the tax, Jesus said, "Go thou to the sea, and cast a hook and take up the first fish that cometh up; and when thou hast opened his mouth, thou shalt find a piece of money; that take and give unto them for me and thee." So Je-

sus our Lord taught Peter that he can make whatever use he pleases of his creatures. Sometimes he fed thousands of hungry people with a few loaves of bread and a few little fishes. This great and kind Lord and Saviour loves to bless and take care of little children. Oh! how much you ought all to love him and praise him, and to try to be good, that you may go to live with him in Heaven when you die. Now learn to repeat—

Let little children come to me,
The Lord our Saviour says;
May we obey him, and good be
In all our words and ways.

NATURAL HISTORY.

Teacher. Children, if you could look so closely at a fish, as the children in this picture seem to be looking at one which the woman holds in her hand, you would see its gills through which it breathes. How do you think a fish gets air to breathe?

Children. It puts its head out of the water.

Teacher. Some fishes rise every few minutes to the top of the water for air. But there is always some air in water, and a great many fishes get all the air they need without putting their heads out of the water; for with their gills they can separate air from it. If you were to put your finger on a fish, close behind the head, and raise up the part which covers the gills, you would see that there are four on each side of the fish, formed either of bone or cartilage, in the shape of half a circle, with a red fringe along the edge. In that are little veins through which all the blood of the fish passes. A fish is continually moving its lips to take water into its mouth; the *gills* take air from that water, and then open and let it out; so they are con-

stantly opening and shutting to supply the fish with air. A fish needs air, not only for breath, but to fill a very useful little bag, which is within its body. What would you call such a bag?

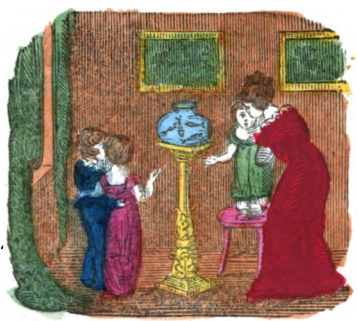
Children. An air bag.

Teacher. It is called an air-bladder: when that is spread out with air, the fish can float near to the top of the water, but when it wants to sink, it can make its body heavier, by pressing the sides of the bag, and then down it goes as far as it chooses to go, even in a deep sea. How do you think it gets up again?

Children. It swims up.

Teacher. It spreads out its air-bag with air, and then it can swim upwards. Here is a picture of some children looking at

fish swimming in a glass shaped like a globe.



Fish kept in such a glass are called gold-fish. They are natives of China, and a great many have been taken into other countries. It is very pleasing to look at them swimming in the clear water: some are red, and look as if they were sprinkled with gold dust; some are silvery, spotted with red; and some look like

gold. Do you recollect whether a fish can hear?

Children. Yes, a fish can hear.

Teacher. Kinds of fish called Carp and Pike, are sometimes kept in a pond, and fed, and when the person who feeds them calls them, or rings a little bell, old and young swim as fast as they can, to the edge of the pond, and some will eat crumbs out of the hand. Do you know what most fishes like to eat?

Children. Fishes eat worms and insects.

Teacher. They are voracious, that is, very hungry animals, and dart at every thing that looks as if they could eat it. Once a horse was drinking in a river, and a fish caught hold of his nose, to eat it, and held so tight that the horse had to

shake his head very fast, to make the fish let go. Fishes eat each other. God chooses that they shall do so; if they did not, there would not be room for all of them, in all the water that is in the earth. But the large fishes would eat all the smaller ones, if God had not given them the power to defend themselves. Look at this one:

What does its long snout look like?

Children. Like a saw.

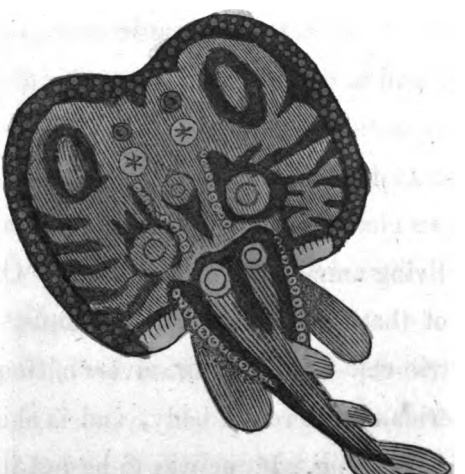
Teacher. It is bony, and notched like a saw. The saw-fish lives in seas, and sometimes grows as long as a bench on which fifteen children could sit. But there are larger fish than it, and it uses

its saw to strike and cut them when they attack it. What other use do you think it can make of its saw?

Children. It might use it to kill less fishes to eat.

Teacher. It does; for God has given it instinct to direct it to use its saw to get food, and to defend itself too. He gives a very wonderful power to some kinds of fishes called *electric fishes.* They can give an electric shock, that is, can make any living animal feel numb all over. One fish of that kind is called a gymnotus, or electric eel. It lives in the rivers of South America, has a round body, and is about three feet long. If one was to be put into a large tub of water, and ten of you were to stand in a row holding each other's

hands, and the one next to the gymnotus was to touch it, even with a stick, each one would feel pain, and as if you were numb all over. Here is the picture of another kind of electric fish called a *Torpedo.* What shape is it?



Children. It looks almost round.

Teacher. It is a flat fish, with a head

almost as large as its body; and can hear well through the little star-shaped openings on its head. It sometimes grows so large as to weigh sixty pounds. It lives in seas, but can live twenty-four hours out of the water; so, sometimes it comes to the shore of the sea, and hides itself there, by flapping a shower of sand over its body with its tail. When it is in the deep sea, and larger fish come near to it, the Torpedo gives them a shock, and so can get away while they are too numb to swim. What other use do you think it makes of this wonderful power which God has given to it?

Children. It numbs little fish so that it can catch them easily, for they cannot swim away when they are numb.

Teacher. There is a fish which can pop out of the water, and fly to escape from a big one. What would you call such a fish?

Children. A flying fish.

Teacher. It lives in seas, is about from ten to twelve inches in length, and is of a blueish colour. Its ventral and tail fins are red. Its pectoral fins are blue, edged with yellow, and are almost as long as its body; it can spread them, and mount into the air, and fly when a large fish chases it, but cannot fly far. It dips into the

water to rest itself, and then pops out again. Flying fish sometimes go in shoals; and will often fly on board of ships at sea. What is a shoal of fishes?

Children. A great many together.

Teacher. Some kinds *migrate* in shoals; that is, go a great distance from one place to another. God causes them to do so, that a great many people in different parts of the world may get the kinds of fish which are best for food. And of such fish he makes the greatest number. Herrings, which are very good food, live a few months in the icy seas; instinct leads them, early in the year, to swim from there to put their eggs in shallow water, to be hatched. Some shoals are ten miles long, and five broad. They swim to the

coasts of different parts of Europe; and some come to some of the bays and rivers of America. Plenty of them are caught. What we call the *roe* of a herring is its eggs, and one has at least a million of eggs. The eggs which are put in shallow water are hatched, and the young herrings swim away to the icy seas, to stay until it is time for them to come in shoals with their eggs. What other fish come in shoals in the spring?

Children. Shad come in the spring.

Teacher. Some American shad grow large enough to weigh twenty pounds; but most of them weigh only seven or eight pounds. They live a part of the year in the Atlantic Ocean. There is a little white flower, which blooms very

early in the spring, and is called a shad-blossom, because, about the time it blooms, shad come from the sea, and swim up the river in shoals. Thousands are caught to be eaten fresh, and tens of thousands in nets, to be put up into barrels with salt, which keeps them a long time very good to eat. Most American children know what good food shad are, and mackerel which swim in shoals, too. When fishes come in shoals, it is a feasting time for the birds which love to eat fish. An eagle loves fish, but cannot go into the water for them. What do you think he does when he sees a fish-hawk with one?

Children. He takes it from him.

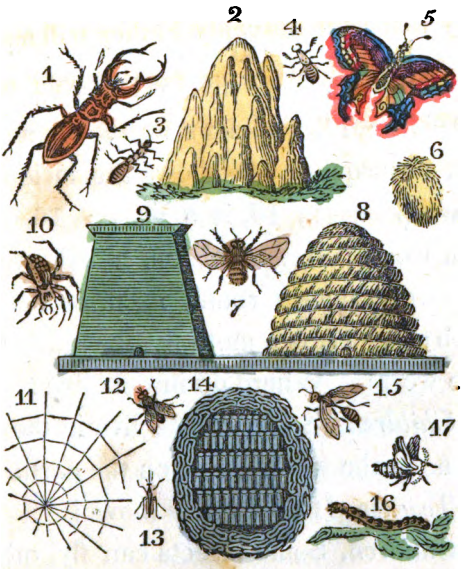
Teacher. He chases the hawk, which, when the eagle comes near, screams and

drops the fish; then down the eagle darts, and catches the fish before it reaches the water: so sometimes a hawk has to be a fisher for an eagle. A cormorant can be taught to fish for men. It is a large bird with webbed feet, and claws notched like a saw. When this bird sees a fish deep in the water of a river, or a lake, he plunges in and seizes it with his notched claws, then with his other foot raises himself to the top of the water, and then throws the fish up into the air and opens his wide bill, and catches it as it falls head foremost, and swallows it whole. In some parts of China, a man will tame twenty cormorants, and when he wants fish he ties a string round the neck of each bird, that it may feel it cannot swallow a fish;

then he takes them all in his boat on a lake and lets them fly over the water. Each bird soon plunges in, and catches a fish in its claws, but feels it cannot swallow it, and so brings it to the boat, where the China man sits, and thus gets as many fishes as he wants without the trouble of catching them himself. In some parts of the world the people eat more fish than any other kind of food, and there are a great many kinds eaten which I have not told you of. Men sometimes make a living by catching fish. We learn in the Bible, that many of the men who loved to be always with our Saviour, were poor fishermen. They listened to what he said, and they prayed that they might be able to do what he taught. If you wish

to learn what Jesus said and did, and will pray that your heavenly Father will make you love to do what he taught, you will be very happy, and may be more merry than any of the liveliest little fishes which play in the water.

NATURAL HISTORY.



INSECTS.

Teacher. Look at these animals of the fifth class! What are they?

Children. Insects.

Teacher. No. 1, is a stag beetle; 3, a

white ant king; 4, a labourer; and 2, is the house which the white ant labourers build; 5, a butterfly; 7, a bee; 8, a straw bee hive; 9, a bee hive of boards; 10, is a spider; 11, a spider's web; 12, a fly; 13, a musquito; 14, shows the inside of a wasp's nest; 15, is a wasp; 16, is a silk worm; 6, the cocoon, a ball which the worm makes round itself, of silk or web; and 17, is a moth fly, the mother of the worm. Where do insects live?

Children. Some insects live in the air, some in the water, some on the earth.

Teacher. How do they move?

Children. Some insects can fly, others can swim, or crawl, or run, or jump.

Teacher. Insects have not bones; but God puts on them a covering like a shell; or else a tough skin in rings round the body. Most insects, have a body divided

into three parts, the head, the trunk, and the abdomen; as you may see in a fly.

The head moves on a little joint, that fastens it to the trunk, on which the wings and legs are. The trunk is joined to the abdomen, which is the hinder part of the insect, and is formed of skinny rings, in which are small holes called *spiracles;* through those, the insect breathes, and not through its mouth. Within the last ring, most insects have a sting, or saw, or little auger to bore holes with, and have on the head *antennæ*, which look

like two horns; they are jointed, that the insect may turn them every way, and touch with them what it wants to feel. Insects have the five senses; what does that mean?

Children. That insects can feel, and hear, and see, and smell, and taste.

Teacher. Insects that chew their food have sharp jaws; they do not move up and down, but sideways, and cut like teeth. On the mouth are short feelers, called *palpi;* with them the insect touches food, to try if it is the kind it will like. God chooses that some insects shall suck their food, and he forms their mouths for doing so. The mouths of some are like a hollow straw; some mouths have a long case over them, pointed at the end, to cut a hole in the skin of animals; then the insect can suck blood from them. An in-

sect cannot move its eyes, but it can see all round; for each eye ball is like several thousand little eyes put together. What do you see on the head of a fly?

Children. Two brown eyes.

Teacher. On each of those little brown balls are more than a thousand eyes, so small that you cannot see them, unless you look through a glass, which makes them seem much larger than they are. All insects have six legs; some have more. A fly has little brushes on its legs; if you watch one, you will see it brushing itself with them. How many wings has a fly?

Children. A fly has two wings.

Teacher. It can strike them up and down so fast that you cannot see them move, when the fly is darting about like an arrow. Have all insects wings?

Children. Some insects are without wings.

Teacher. Some have two, some four. Some wings are like fine lace work; and glitter with purple and gold colours, as the happy insect flies in the sun. Beetles have a pair of wings, like a shell case, which shuts close, and covers a thin pair, to keep them from being spoiled if the beetle goes into the water, or when it is boring a hole in old wood to put its eggs in. The big black bugs which fly into the house in a summer night, are beetles. What happens to them when they strike against the wall?

Children. They fall on the floor.

Teacher. When one is falling, its instinct teaches it to fold its fine wings under their cases; and to seem as if it is dead when it is touched. It would let

you handle it, and would not move a leg; but when put down, it would soon uscase its wings and fly away, buzzing gladly. Do all insects make noises alike?

Children. Some insects buzz, some chirp, some sing as if they were saying little words, as katy-did, katy-did.

Teacher. A beetle makes a buzz by rubbing the cases of its wings against its body. A cricket has softer wing cases than a beetle, but by rubbing them against each other, can make a loud chirp. A katy-did has a little spot on its body, which serves as a drum to make a sound, when it rubs its legs against its wing cases. Some insects tick with their jaws; and many make a hum, by moving a nob that is on the under part of the wing, against a scale that is on the body. How do birds show that they are happy?

Children. Birds sing.

Teacher. Insects tell us, by the sounds they make, that their kind Creator makes them happy too. Do they all sing at the same time?

Children. Some insects sing in the day; some in the night.

Teacher. We say an insect sings, though it does not make its sound with a voice. God teaches all insects when to be still, and when to make their happy sounds. There is one that is a merry little thing, though it makes no noise. It is not

much larger than the head of a pin; but this picture shows how it is formed. It

is a flea, its body is covered with rings of tough smooth skin; it has large eyes; and a sharp mouth formed of seven pieces, to cut and suck with. It can fold up its six legs; but when it wants to jump, they all spring out, and it can jump with them very far. If you could jump like a flea, you might easily jump over a high house. Some insects are so small, that they can scarcely be seen; yet each one is as well formed as the largest animal is. How can such little things know what to do for themselves and their young ones?

Children. By giving them instinct, God teaches them what to do, and what is best for them.

Teacher. Every plant and flower is a home for insects. To some tiny insects, the small flower they live in seems a large world; and a dew drop on a leaf is to

some like an ocean. Little companies of insects frisk about in the sweet rose; some play in the air, some on the water; all have pleasure where their Creator has chosen they shall live. O how kind our Heavenly Father is! What does the bible teach you about his kindness to his creatures?

Children. "The Lord *is* good too all; and his tender mercies *are* over all his works."

Teacher. Where does God teach insects to go when winter is near?

Children. Insects are hid in winter.

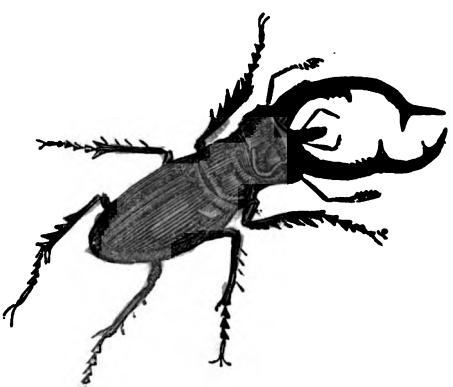
Teacher. Some go under the bark of trees, some under stones, some creep into cracks of walls, some push themselves into soft mud, and some bury themselves deep in the ground. They fold up their wings and antennæ, and do not need food,

but lie as if they were asleep until a warm day in the spring, and then they leave their hiding places, and run, or jump, or swim, or fly about merrily. Do insects lay eggs?

Children. Most insects lay eggs.

Teacher. Most insects change their forms several times. The egg becomes a little worm called a *larva*; it has feet to crawl with; or else moves itself by the skinny rings of its body; a caterpillar is the larva of a butterfly. A larva has sharp teeth, and eats until the time comes for it to change, then it stops eating and shuts itself up in a cocoon, which is a covering God teaches it to make for itself. All do not make cocoons alike. When a larva has thus covered itself, it is called a *pupa*. It does not eat, but lies as if it were asleep, while it is changing to

another shape. At the right time, it has a mouth, with which it can cut open its covering, and out it comes, with six legs, and two or four wings, a happy perfect insect, with instinct to know every thing it should do. An insect mother puts her eggs where each larva can get the food it likes. A stag beetle puts its



eggs in the hollows of old trees; each larva eats the soft mouldy wood, and

then uses some to make a cocoon, as large as a hen's egg, in which it is a pupa three months, and then comes out a winged stag beetle. Some little beetles, with their sharp horny mouths, bore a hole in nuts and put their eggs in; so what would you call the soft worm you sometimes find in a nut?

Children. The larva of a little beetle.

Teacher. It is hatched in the nut, and eats the kernel, and takes care to knaw all round the edge of the hole its mother bored in the nut, that it may, by stretching itself, come out through it. Then it changes to a pupa, and that becomes a beetle.

Some insects change their skins. One kind that does so, has a sharp mouth to cut skin, that it may suck blood. It sounds its wing trumpet in a summer night and

you feel its sharp mouth cutting your skin: what is it?

Children. A musquito.

Teacher. A little girl who thought its name *Miss Keter*, was angry with one that bit her, and said I will not call you *Miss* but only *Keter*. We should not be angry with them for taking the kind of drink they need; but God allows us to kill them. A musquito stands on a chip, or leaf that is floating on the water, and lays at least a hundred eggs.

The eggs stick to each other, and when they are dropped on the water float like a little raft. In a few days a larva comes from each egg, and changes its skin three times, and is three different shapes, and

then rolls itself up, and within its skin changes into an insect with wings. If it could not keep its head out of the water, then what would become of it?

Children. It would be drowned.

Teacher. It raises its body from its skin cover, so as to form a mast, and a sail, to make it like a boat, in which it floats

safely, until it can use its wings to fly away. God does not allow us to know the good use he has formed every insect for; but we do know many are useful for medicines; some to make pretty colours to dye with; some make the silks; some make honey; and even flies are useful to

us, for they eat up many things that would make the air unhealthy in warm weather. Now, children, when you see an insect, do not hurt it; but remember, what a well-formed little creature it is, and ask its Creator, your Heavenly Father, to make you love him so much, that you will think and say with delight,

How kind in all his works and ways
Must our Creator be;
And I am taught to give him praise,
By insects that I see.

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HIVE-BEE.

Teacher. Of what use are bee-hives?

Children. Bees live in them.

T. Some hives are round, made of plaited straw; some are made of boards; but all have a small hole in the side for bees to go in and out. Glass hives are sometimes made that the bees may be seen at work in them. How many kinds of bees are in one hive?

C. Three kinds; males called drones,

females called queens, and bees called workers.

T. Are they all of the same size?

C. No; a queen is larger than a drone, and a drone is larger than a worker.

T. What work do bees do?

C. Bees gather honey, which God puts in flowers.

T. Yes, and he teaches them to get from flowers a dust called *pollen*, which looks like meal, and which they mix with honey, to make bee-bread. A bee has four thin strong wings. What are on its head?

C. Feelers, called *Antennæ.*

T. They are short, but have twelve joints. The body of a bee is covered with soft hairs, and on its legs are stiff hairs like a brush. In each hind leg there is a little hollow which serves as a basket to carry pollen in. The bee has sharp teeth; has it a tongue?

C. It has a long rough tongue which it can roll up under its head, or stretch out to put into a flower, to lap honey.

T. In its stomach is a little bag for the honey to run into. Can a bee hurt you?

C. Yes, a bee has a sting.

T. A bee will not hurt you unless it fears that you are going to do it some harm. God has given it a curious sting to defend itself from wasps and other in-

sects, which try to kill it, that they may get its bag of honey. The drones have no sting; they are idle, and are often turned out of the hive by the workers. Some of you have seen a cake of wax with little holes in it filled with honey; what is it called?

C. Honey-comb.

T. It is a part of the little city, which bees build in a hive. The holes are called cells, they are to put honey and bee-bread in, and are used, too, to nurse young bees in. How many bees can work in one hive?

C. Twenty thousand, or more.

T. How can so many work well in a little hive?

C. Because each one does every thing that is right for it to do.

T. How should you be like them?

C. We should do every thing that is right for us to do.

T. The working bees are never idle, nor selfish, all work to help each other, like a kind family. The queen of a hive does not work, but lays all the eggs. The workers love her very much; they bring her honey and bee-bread to eat; and do every thing that she wants them to do. Can animals make each other know what they want, as if they could talk?

C. Yes: a hen can cluck! cluck! and then her chickens know that she wants them to come to her.

T. Animals have different ways of letting each other know what they would tell, if they could speak. Bees talk to each

other by humming with their wings, or by moving their antennæ. They tap each other with them, or cross them, or move them in other ways, which they know the meaning of. Some workers always watch the antennæ of the queen bee, that they may know what she wants them to do; and then they behave as good children behave to a mother; how is that?

C. They do what she wants them to do.

T. Bees sometimes are sick; if their queen is sick, the workers fan her with their wings, and try to make her well. If she dies they make a sorrowful hum. What do you think they do if she gets well?

C. They make a joyful hum.

T. The queen loves them, as much as

they love her; and if she is taken away from them, she will not eat, and soon dies. When bees are preparing to build in a hive, they divide themselves into companies, and each company has to do a different part of the work. The bees of one company walk all round the hive to find cracks through which rain might drop, or unfriendly insects might creep in; then they fly to a willow or poplar tree for a soft gum, called *propolis*, which they know how to get from the buds of those trees. They fill their baskets with it, and return to the hive. What do you think they do then, with that bee-glue?

C. Stop up the cracks.

T. Yes. Before the door of a hive, a bee walks, as a guard, to keep out ene-

mies, but sometimes a cunning snail slips in; what do you think the bees do to him?

C. They sting him.

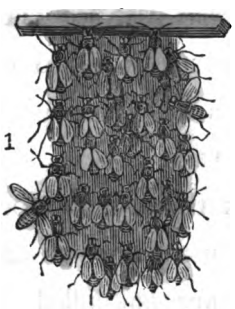
T. And kill him for wanting to steal their honey: and if they cannot drag out his dead body, they cover it with bee-glue; for they keep their hive very nice. What do they build comb with?

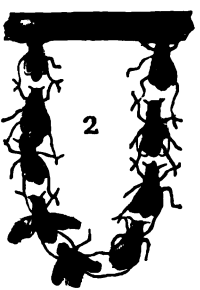
C. Bees build with wax.

T. The hind part of the body of a bee looks like a little cask, with hoops around it; and when a worker has filled its stomach with honey, some of it changes into wax in the shape of fish scales, and lies in little pockets under the hoops of the bee's body. What are the bees called which have most wax?

C. Wax-workers.

T. They rest for a day, while their pockets are filling with wax. Two cling with their front feet to the top of the hive, two more take hold of their hind legs, others hold by theirs and they hang in this





way. Then other rows hang inside until they look like a little curtain in the hive. What do they do when their wax pockets are full?

C. They begin to build.

T. One bee goes to the part of the hive

where it is best to begin. With the claws of its hind legs it takes from its pocket a scale of wax and puts it on its tongue, with which it can make it soft, and with the help of its claws can draw it out like a narrow ribbon, and that it lays against the roof of the hive for the foundation of a cell. Then one bee after another adds a strip of wax, until a little block of wax is formed. Wax-workers have no more to do to it, and builders come which are called nurse bees; why are they called so?

C. Because they take care of the young bees.

T. One nurse bee after another, digs with its teeth in the side of the block, and places the wax it digs out so as to form the walls of a cell, with a little rim round

the top to make it strong. Then they spread bee-glue on the cell, and rub it with their brushy legs and rough tongues until it shines. When a great many flowers are in bloom, the bees build their cells very deep, for they know they can gather honey to fill them. What shape is best for their cells?

C. The one that will hold most honey.

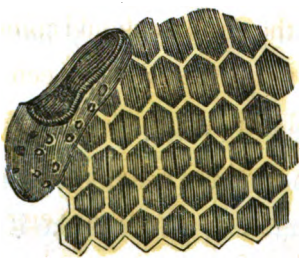
T. That is hexagonal. What does that mean?

C. It has six sides.

T. A hexagonal cell takes less room in the hive, and less wax to make it; and yet holds more honey than one of any other shape would. The wisest man in the world does not know of a better shape. Why are bees so wise?

C. God teaches them.

T. God gives them so much instinct that we may call them very wise insects. A nurse bee can do thirty different things, exactly as they should be done. They make small cells for workers to be nursed in, and larger ones for drones; and use a hundred times more wax, to make a cell



for a queen; as you see in this picture of honey-comb, with cells for workers, and one for a queen. How should bees build

their wax city, that they may go from one part of it to another ?

C. With streets and alleys.

T. They have streets wide enough to pass each other in, and alleys for one at a time to walk through. Once a moth fly slipt into a hive to steal honey, he got out safely, but the bees directly built three little wax walls inside of the hive door, so that if the moth fly should come again, it might not find the way between the walls. When cells are ready for eggs to be put in, five or six workers walk with the queen bee to them, and she puts an egg in every one. What does each egg change into ?

C. A worm called a larva.

T. In three days the egg becomes a larva. Nurse bees feed it with pollen

and honey three times a day, until it is five days old; then it can begin to spin its cocoon; what is that?

C. A covering for its body.

T. When it is time for the larva to make that, the nurse bees cease to feed it, and put a wax lid over its cell. The larva then, with a thick juice which is in its mouth, can make a silky thread, with which it lines its cell, and then winds some round itself for a cocoon, in which it lies still. What is it called then?

C. A pupa.

T. It is a pupa ten days; then it has teeth with which it can cut its way through its cocoon, and the lid of its cell; and what do you think it is when it comes out?

C. A young bee.

T. Yes. A nurse bee helps it to unfold its wings, and stretch out its legs; then it crawls to the door of the hive, and when it feels the fresh air it can soon flutter its wings into a joyful hum and fly away to do what older bees do.

It is a pretty sight, to see
In bright and sunny hours,
The young and happy little bee,
Amid the sweetest flowers.

It shows that God is very kind,
For though it is so small,
'Tis taught its useful food to find,
By Him who cares for all.

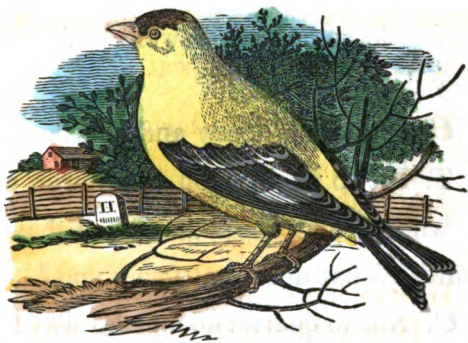
Many years ago, a clergyman, called Dr. Watts, who was a friend to children, wrote pretty verses about the bee, which you should learn to repeat.

How doth the little busy bee
Improve each shining hour;
And gather honey all the day
From every opening flower.

How skilfully she builds her cell,
How neat she spreads the wax!
And labours hard to store it well,
With the sweet food she makes.

In works of labour, or of skill,
I would be busy too;
For Satan finds some mischief still,
For idle hands to do.

In books, or work, or healthful play,
Let my first years be past;
That I may give for every day
Some good account at last.



THE GOLDFINCH AND MANY BIRDS.

T. Many birds fly to a warm country before winter, and return in the spring. What is in the Bible about flowers and birds in the spring?

C. "The flowers appear on the earth; and the time of the singing of birds is come."

T. While birds are busy then making their nests, bees too are busy amidst the apple blossoms, and flowers. What are they doing?

C. Gathering honey and pollen.

T. If two alight upon one flower, each is willing that the other shall have a share. What does that teach you?

C. Not to quarrel about who shall have most of any thing; but each to be willing let the other have a share.

T. A bee flies from flower to flower, and darts in its tongue, and laps up all the honey it can find, until it fills its honey-bag. Then it turns its hairy body round and round, in a flower, until it is covered with pollen; which sometimes makes it look as if it had a yellow dress on. With the

stiff hairs of its legs it brushes that yellow dust nicely off, and then makes little balls of it. How can it carry them?

C. God has given it little baskets in its hind legs to carry pollen in.

T. With its other legs it puts the pollen balls in, and pats them close; then, though it may be more than a mile from its hive, it flies straight to it, and goes in with its useful load. What should some of the workers in the hive do then?

C. They should help it to take the pollen out of its baskets.

T. They do. If they are hungry, they

eat some, if not put it all in cells for bee-bread, when none can be gathered. If they want honey to eat, what should the little gatherer do?

C. Give them some from its bag.

T. It lets the honey run into its mouth, and opens that and gives them as much as they want. But if they do not want any, it puts all into a cell, and they cover it with a wax lid to keep till the time when no flowers are in bloom. What may you learn from this conduct of bees?

C. To be kind in helping each other; and willing to give to those who are hungry what we can spare.

T. What else may you learn?

C. To take care of what we do not give away, or want to use directly; that

we may have it when we cannot get more.

T. The bees of a large hive, and in a place where there are many flowers can gather in one season more than fifty pounds of pollen, and fifty quarts of honey. Think how much little bees do, by being willing to do what bees can do. How should you be like them?

C. We should be willing to be busy in doing what is right for children to do.

T. If their hive gets too warm, the bees have no windows in it to open and let in fresh air; so one company after another stand in a row on the floor of the hive, near to the door way, and open their wings at the same time, and move them backwards and forwards to fan air into

the hive until it is cool enough. What is the bee that lays all the eggs called?

C. The queen bee.

T. All the bees obey her; and when there are too many in the hive, so that there is not room to work, she leads a swarm out to build in another place; and the bees that remain in the hive, nurse a queen for themselves, and all hum with joy when that young queen bee comes out of her cocoon. What is a swarm?

C. A great many together.

T. When bees are preparing for a swarm to leave the hive, they do not go out to gather honey for a day or two. They are in a great bustle and hum, as if they were sounding a trumpet to bring together all that are to go with the queen.

Bees do not like to be wet. God has taught them to know when rain is coming soon; and often, before we could see a rain-cloud, they stop gathering honey and fly to the hive for fear of being in a shower. On a bright day, if the queen is ready to lead a swarm, and a cloud comes, how do you think they behave?

C. They wait till it is gone.

T. Yes; without getting cross, because they have to wait. Often when the queen flies out, more than seven thousand follow her. Sometimes she flies away over a harvest-field, and goes into a hollow place of such an old tree as this. But if the owner of the hive has heard the hum the bees made before they left it, he has another ready for them to go into. Sometimes to stop

them from going away, he dips a sweeping brush in water, and sprinkles the queen, and then she lights upon a branch. Do you think the other bees go away?

C. No, they stay with her.

T. They all cling round her, and hang together. Then the empty hive is put under them, and they are shaken softly from the branch into it and it is turned up, and put near to the hive they left. Several swarms go from a hive in one

season, but a family is left in the old hive; so one family after another will live in one hive for twenty years. How long does a bee live?

C. A queen bee lives two years. A worker one year. Drones live only a few months.

T. How are bees useful to us?

C. They gather honey for us.

T. Our kind Heavenly Father teaches them to gather more than they can use. In very cold weather, they seem to be asleep, and do not often eat; so they can spare the most of the honey they have gathered in the summer. Some bee owners make a smoke under the hive to kill the bees, and then take all the honey-comb. Some have hives from which they can

take what the bees can spare. Is not that the best way?

C. Yes, some should be left for the little workers to eat in winter.

T. What else do we get from bees?

C. We get wax from bees.

T. When the honey is taken out, the comb is melted and strained, and when it cools it is clean wax. It can be bleached, that is made white, by spreading it in the sun. Apothecaries have round cakes of white wax, which they use in some medicines. What else is wax used for?

C. Candles are made of it.

T. Bees provide almost all the candles in some countries. Wax is used, too, for many other purposes. In some countries sugar is very scarce, and honey is used

instead of it. In Egypt so much honey and wax is used, and so much sent to other countries, that one man will own a great many thousand hives, and get rich by selling honey and wax. Tell me the name of a river which is in Egypt.

C. The river Nile is in Egypt.

T. Sweet flowers grow near to it, and sometimes a bee owner puts four thousand hives in a boat, to sail on the Nile and stop for a few days where most flowers grow. Why does he do so?

C. That his bees may get plenty of honey and pollen.

T. What kind of bees build in the holes of rocks and hollows of old trees?

C. Wild bees.

T. In America, some build in old trees

honey-comb as long as a tall man. Honey-hunters put honey where the wild bees can come to it, and when they have filled their bags, the hunters watch which way they all fly, and then can find their tree hive, for the bees go to it as if they were flying along a straight path. A bird shows the Hottentots where wild bees build. In which part of the world do Hottentots live?

C. In the south part of Africa, at the Cape of Good Hope

T. A bird lives there which loves honey, but is afraid to try to take it from the bees. It chirps gladly when it has found a tree in which they have a comb; and when a Hottentot hears it, he follows it as it flies from tree to tree and it guides him

to the one in which he can find honey; and he always gives some to the bird. What do you think it is called?

C. A honey guide.

T. In the Bible a land is described in which the people did not need a honey guide; it was called Canaan. What do you know about it?

C. It was "A land flowing with milk and honey."

T. What were the people called whom God brought out of Egypt into Canaan?

C. Israelites.

T. Moses was their leader, and God directed him to send men into Canaan to see what kind of land it was. Two of them brought back good fruit called pomegranates, and figs; and a cluster of

grapes, which they hung on a staff and carried between them. So much grass grew there that herds of cows and goats could have pasture, and give plenty of milk, so it was a land "flowing with milk." Why was it called a land "flowing with honey?"

C. Because a great many flowers grew there from which bees could get honey.

T. They put so much in the hollows

of rocks, and trees, that often it flowed out in little streams, upon the ground. In the Bible is the history of a good king of the Israelites. What was his name?

C. King David.

T. When he was young, and took care of his father's sheep, he used to climb the rocks and old trees, to get honey, for he loved it very much. What did he say to his Heavenly Father about what He teaches in the Bible.

C. "How sweet are thy words unto my taste! yea, sweeter than honey to my mouth."

T. What did he mean?

C. He meant that he loved better than any thing else to learn what God teaches in the Bible.

T. I hope you will all pray to our Heavenly Father to make you love Him so much that you will delight to learn what he teaches in the Bible more than any thing else; and that like the little bees you may be always busy trying to do what it is right for you to do. Then you may be more happy than they when they hum from flower to flower, without thinking; for you can think of the kindness of God your Saviour, and be the dear children whom He says He will bless.

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THE HUMBLE-BEE AND WASP.

T. Children, here is the picture of a nest which *humble-bees* build. What do you sometimes call all bees?

C. Bumble-bees.

T. Do not say bumble, say *humble-bees;* but hive-bees are not humble-bees; they are larger than hive-bees, and have

a gayer dress of yellow and black. Only a few hundreds live together; sometimes only twenty. Those which make a nest like the picture, are named carder-bees. When they want to build they look for a shallow hole in the ground; if they cannot find one, what do you think they do?

C. They make one.

T. They dig one close to a bunch of grass or moss; then they stand in a row, one behind the other, with their heads towards the moss. The bee nearest to the moss takes some in her mouth, and pulls it apart with her fore feet, and then rolls it together; that is called *carding* it. The little carder then pushes the grass or moss roll under her body to the bee which stands behind her, that bee pushes it to the next; and so one pushes it to another until it is close to the hole they had dug.—

When they have there as much grass or moss as they want, what do you think they do?

C. Make a nest with it.

T. They make with it such a roof over the hole as you see in the picture; but rain might come through it, so they put inside a ceiling of coarse wax. Carder-bees have no queen; but there are mothers, drones, and workers. The workers make wax cells in the nest; the mothers put eggs in them with bee-bread, and then cover them. What comes out of the eggs?

C. Little worms called larva.

T. Each larva spins round itself a cocoon. In five days the workers know that it is ready to come out, so they gnaw a hole in its cocoon, and a young carder-bee comes out and unfolds its pretty wings. The workers then put a wax rim round

the hole in the cocoon, to make a honey pot of it, which the mother bee soon fills with honey. In this picture of the inside of a carder-bee's nest, the wax ceiling is rolled up a little, to show five cocoons, a honey pot, and three young bees. Some-

times hive-bees cannot get honey when the humble-bees can; for if they cannot reach the honey cup of some flowers by going into the flower, as hive-bees do, they go out side, and bore a hole into the honey

cup, and then can get the honey. Once some hive-bees could not get any honey, and they went to an humble-bee's nest and took their honey. They soon came for more; and what do you think the humble-bees did to them?

C. Sting them and drive them away.

T. No. They did as we ought to do to each other. What does Christ teach us that we should do to others?

C. As we would wish them to do to us.

T. Dear children, pray to your heavenly Father to make you so good, that you will always do to others as you would wish them to do to you.

Bees, you know, have not souls that can learn what God teaches us in the Bible; but the humble-bees I was telling you of, when the hive-bees came back for more honey, gave it to them, and for three weeks let

them have a part of all that they could gather. There are humble-bees which make nests in the ground and cover them with flat roofs of dry grass; and there are humble-bees called solitary bees, because they do not live with others. How do they live?

C. They live by themselves.

T. Each one builds a nest for itself without help. One kind gathers sand and clay, and by wetting them with a juice from her mouth like glue, she sticks them together in a lump almost as large as a small pea, and she glues this on a wall in some sunny spot. She puts a great many of those clay and sand lumps together, as a mason lays stones or bricks when he is building a house. What might we call that bee?

C. A mason-bee.

T. Yes. She builds four little rooms in the shape of thimbles; in each she puts an egg and some bee bread for the larva, and then covers all the rooms with a roof of clay with little stones in it, so that her nest looks like this picture. The sun shin-

ing on the clay makes it almost as hard as a stone; but God gives the young mason-bees jaws, with which they can cut their way through it, and then away they fly, humming gladly.

Another mason-bee looks for a wide crack in a wall, and makes clay walls in-

side of that; then with lumps of clay she builds six cells like these. She puts an

egg and some food for a larva in each cell, and then builds a clay wall so as to cover all. Another solitary bee works like a carpenter, so what may she be called?

C. A carpenter-bee.

T. With her sharp jaws she bores a long round hole in an old tree or a post, and sometimes in the wood-work of a house. She scrapes out the sawdust so that it falls together in a little heap; then she brushes the hole nicely, and flies humming to a flower to get honey and pollen. Why does she get them?

C. She wants them to make bee-bread.

T. Yes, and that she puts in the bottom of the hole, and then puts an egg in. Then she goes to the little heap of sawdust, and takes some in her mouth, and glues it together, and makes with it a ceiling far enough above the bottom of the hole to form a little room for a young bee. She makes twelve little rooms with sawdust ceilings, and in each puts an egg and some food for a larva. The little carpenter is busy for several weeks before she finishes her house, with so many rooms in it. In which room will there first be a young carpenter ready to fly?

C. In the room where the first egg was put.

T. If it had no other way to get out, than through the rooms of its little brothers and sisters it would disturb them;

so its careful mother bores a way for it to come through, like a back-door, and then out it comes and flies off; and all the rest of the young bees, one after another, come down and go out that way too.

There is another bee that cuts green leaves to form a nest; so what may it be called?

C. A leaf-cutter bee.

T. She bores a round hole in the ground, then flies to a rose-bush, and using her jaws as if they were little scissors, she cuts a piece of leaf and carries it with her hind

legs to the hole, and lays it neatly in the bottom.

Then she cuts pieces of different shapes. And she lays them round the hole to make a cell in the shape of a thimble; in that she puts an egg and food, and then cuts a round piece of leaf, to fit the top. She makes six of those pretty green rooms joined together, so that they look like this

picture. Another leaf-cutter makes a square hole in the ground, and lines it with bits of the leaves of red poppy flowers. She puts in an egg and food for a larva, and then folds the red lining over and puts a little heap of earth for a roof. I will not tell you now of any other bees; but I will tell you about an insect that stings very sharply, and of which children

are very much afraid. Do you know what insect that is?

C. A wasp.

T. Yes. In the picture of insects you may see a wasp. It has a thin, smooth body, with yellow streaks upon it; four wings, two eyes, shaped like a half moon. God has not formed the wasp with a tongue to lap honey from flowers; it has a horny mouth to get the kind of food which He chooses it shall eat. A wasp feeds its larva as birds feed their young, often in the day. Wasps kill bees to get their honey bags, which they take to their larva. They feed them with that and the juice of fruit, when they are very young, and afterwards give them caterpillars, and flies, and little bits of meat, if they get them. Butchers like to see them come for meat in a hot day, for they catch

the kind of flies that would spoil the meat. They come into houses and take sugar, and whatever they can find that is sweet; so what do they seem to be?

C. Very greedy.

T. They are only taking the food which God allows them to have for their larvæ; and they seldom sting unless they are disturbed. There are solitary mason-wasps, which build curious nests in hard sand banks. And one kind of wasp makes a nest of clay like a little cake, with cells in it. Once a lady put on a gown which had been hanging up in a room for several weeks. She wore it almost all day, but thought she felt something heavy in the sleeve; and when she took it off, what do you think she found there?

C. A wasp's clay nest.

T. Yes. It was a snug place for a soli-

tary wasp to build in. Most wasps live together in little companies. There are males, females, and smaller wasps which do the most of the work, and are named neuters. They look as if they had bright yellow jackets. What are they sometimes called?

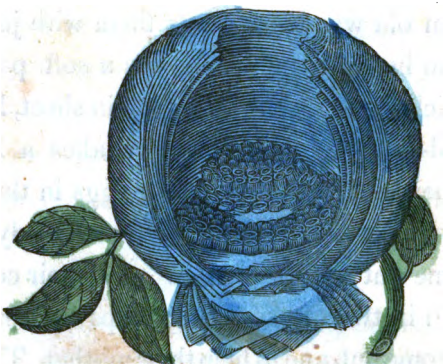
C. Yellow-jackets.

T. There are twenty or thirty thousand wasps in one nest; so if they all lived to build the next year and raise young ones there would be too many; but before winter all of them die except a few females, who sleep until spring, and then are ready to begin to build. Each one bores a long hole in the ground, for an entry to a large hole which she digs, and then begins to build a paper nest in. Where do you think she gets the paper?

C. God teaches her how to make it.

T. Yes. With her jaws she tears strips from old wood, and wets them with juice from her mouth, and makes a soft paste which she spreads out in a thin sheet, like lead-coloured paper. She makes a few paper cells, and puts neuter eggs in them. She feeds the larvæ till they are ready to come out to spin a cover over their cells, then in two weeks young wasps are ready to come out, and to help their mother. They build a nest of ten or twelve walls of their paper, a little way apart, that rain may run between them. In this nest they make rows of paper cells as you may see in the picture of insects. Hornets are a large and fierce kind of wasps. They build coarse paper nests larger than a man's head, and fasten them to a fence or the branch of a tree. One kind of wasps, fasten to a branch, a nest in the form of a

half blown rose. Here is a picture of it,



that shows the cells inside. I have told you, dear children, of some of the ways in which wasps and humble-bees show their *instinct*. Now tell me

Who gives to insects different powers,
To spend such busy, happy hours,
While using earth, leaves, and flowers?

C. Our heavenly Father.

T. Yes, for "the Lord is good to all, and His tender mercies are over all his works."